RAINFALL AND RAININESS.[1]

By B. C. WALLIS.

[Dated: 18 Nassau Street, London, W., Apr. 7, 1918.]

An *isarithm* is a line drawn upon a map to indicate that all the places through which the line passes agree in regard to some quantitative evaluation of a geographical fact. The commonest examples of such lines are contours and isotherms.

An *isohyet* is an isarithm which refers to the total quantity of moisture precipitated as rain or snow within a given period.

An *equipluve* is an isarithm which deals with the proportion which the precipitation during a short period such as a month bears to the precipitation for a year. Isohyets indicate rainfall, *equipluves indicate raininess*.

For practical purposes, such as those of the engineer, the conservator of water supplies, isohyets are probably more useful than equipluves; for theoretical purposes, whenever the point of emphasis is *the distribution of the precipitation in time* rather than in space, equipluves for the several months are probably of more use than isohyets. To some minds, particularly those which have been accustomed through many years to the sole use of isohyets, equipluves make little or no appeal; probably because experience and continuous practice have made it possible to adjust the interpretation of isohyets in such a fashion as to read from the map showing isohyets the facts concerning the seasonal distribution of the rainfall.

The precipitation of a given locality is profoundly affected by minute local conditions, both those pertaining to the relief of the land and those which belong to the minor atmospheric conditions due to the accidental local circumstances. These local effects are eliminated from isohyets when the latter are smoothed and generalized in the construction of the map; they tend, however, to be nonexistent in equipluves. Consequently equipluves are more useful in the investigation, e. g., of the seasonal effects of elevation upon precipitation.

For these reasons, it may be advisable to indicate in brief fashion a mechanical device which shows the intimate relation between isohyets and equipluves. Given a monthly set of equipluves and also a map showing the annual precipitation, it is desired to determine the monthly precipitation in inches of rain.

For example, two places **A** and **B** are characterized by the following monthly numbers (pluviometric coefficients) on the equipluve maps, beginning with January:

J	*F*	*M*	*A*	*M*	*J*	*J*	*A*	*S*	*O*	*N*	*D*
47	54	84	102	155	205	170	120	98	72	58	35

The annual rainfall, read from the annual map is 24 inches at **A** and 37 inches at **B**. What are the respective monthly totals? A graph is constructed as figure 1. It is necessary to set up a scale beside the graph for each of the two places. The scale for **A** is determined by the fact that $\frac{1}{12}$ of 24 = 2, so that the inches are marked respectively on a level with the 50, 100, 150, etc., pluviometric coefficients. The scale for **B** depends upon the facts that $\frac{1}{12}$ of 37=3.08, and that, if P. C. 100=3.08 inches, then 1 inch=P. C. 32.5. Reading now from the graph to the separate scales it is determined that the precipitations are:

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
A	0.94	1.08	1.68	2.04	3.10	4.10	3.40	2.40	1.96	1.44	1.16	0.70
B	1.45	1.66	2.58	3.14	4.77	6.31	5.23	3.69	3.02	2.22	1.78	1.08

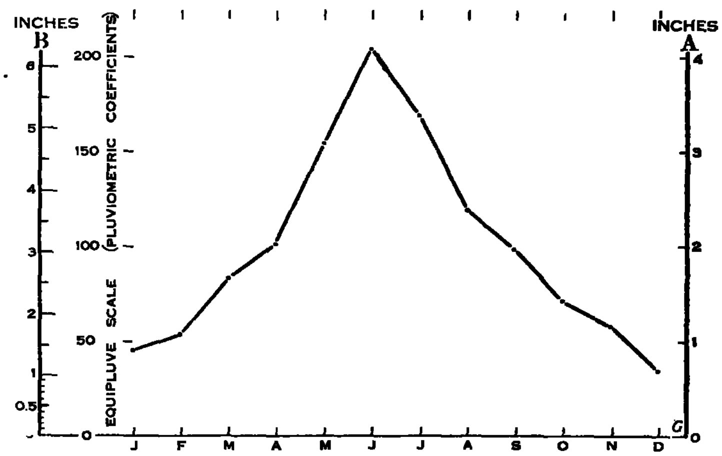

FIG. 1.—Diagram showing relation between isohyets and equipluves for **A** and **B**.

For one or two places the diagram, figure 1, is useful in consequence of the rapidity with which it may be constructed; but for work on several places or at different dates a diagram such as figure 2 is much more useful. Two scales are determined at right angles, one showing pluviometric coeffcients and the other annual rainfall. Calculations are made to find, for example, the pluviometric coefficients equivalent to 1 inch of rain out of the annual totals—5, 10, 15 inches, respectively; the calculated values are plotted and the 1-inch curve is then drawn on the diagram. The other curves are obtained in similar fashion.

To use figure 2 to read from P. C. to inches (or cm.).—Draw a vertical on the diagram to correspond to the annual rainfall, mark on this vertical with the letters *J*, *F*, etc., the values according to the scale of pluviometric coefficients, and then read the values of the points *J*, *F*, etc., in relation to the curves for inches. In figure 2 the verticals are drawn for the places **A** and **B**, and the points are marked in each case for 6 of the 12 months. A glance at the figure shows that the readings of figure 2 correspond with those from figure 1.

To use figure 2 to read from inches to P. C.—Draw the vertical for the annual rainfall, mark the points for the monthly rainfall in inches in relation to the curved lines of the diagram, and read from these points to the scale on the left of the diagram to find the pluviometric coefficients.

To use figure 2 to find the rainy and dry seasons.—Draw a vertical for the annual rainfall, read on the vertical the number of inches of rain corresponding to P. C. 100, 50, and 200. Examine the values for monthly precipitation in relation to the limits thus obtained: Over 100 P. C. is wetter than the average, over 200 P. C. is very wet, and below 50 P. C. is very dry.

[1] Papers dealing with the pluviometric coefficients of the United States will be found in the MONTHLY WEATHER REVIEWS for 1915, January, April.—EDITOR.

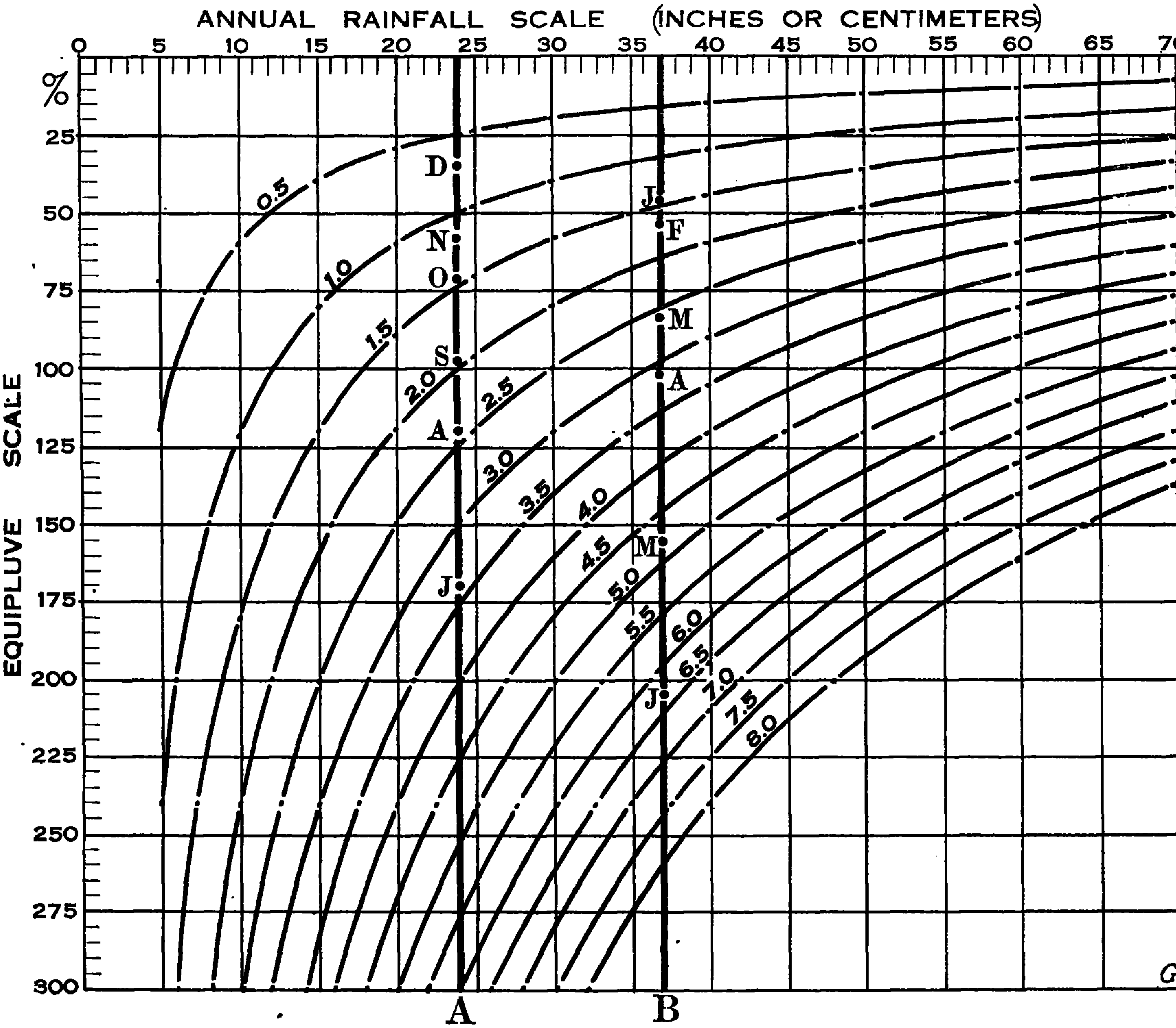

FIG. 2.—Curves for general interconversion of pluviometric coeficients and depths of rainfall, and rapid estimation of raininess.

TORNADO OF MAY 9, 1918, PEARL ROCK TO CALMAR, IOWA.

By HAL P. HARDIN, Observer.

[Dated: Weather Bureau, Charles City, Iowa, May 25, 1918.]

(75th meridian meantime used herein.)

A tornado passed east of this county, Floyd, during the afternoon of May 9, 1918. The storm had some features which have made it difficult to determine whether there was more than one tornado, or only one storm that zigzagged over a strip 2 miles wide and 54 miles long. A straight line through the middle of the zone showing wreckage runs due SW.-NE. and encounters as many buildings and groves untouched as it does objects destroyed, while the character of the wreckage at points a mile or less from such a median line leaves no doubt that a tornado had visited them.

The writer visited Pearl Rock during the afternoon of the following day, i. e., May 10. There the width of the storm's path of destruction was about 200 yards, and could be defined as such for a distance of 2 miles from southwest to northeast. There was no indication of a whirling wind outside that belt, nor for some distance at either end of it. A number of persons who went through the storm at Pearl Rock and other points have told me that they saw the funnel-shaped cloud, heard a roaring noise as that of a rapidly moving railway train, and witnessed an inward-and-upward movement of objects toward it.

Pleasant Valley.—A man who observed the first known formation of the funnel cloud at Lower Pleasant Valley, the point where the storm apparently originated, described to me what he saw, as follows: The weather had been warm, with thundershowers during much of the day. Shortly before 4 p. m. two thunderstorm clouds